**Title: Exploring 3-D Shapes with Captain Invincible**

**Brief Overview:**

In this unit students will explore properties and characteristics of solid shapes in order to identify and name 3-dimensional figures. Students will focus on the similarities and differences between prisms and pyramids as well as the concept of how 2-dimensional nets fold to create 3-dimensional figures. Teachers will engage students through literature, hands on activities, games, and student to student interactions in order to develop the student's understanding of 3-dimensional figures. Prerequisites for this lesson include knowledge of 2-dimensional shapes and properties, faces, edges, vertices, and basic geometric vocabulary.

**NCTM Content Standard**:

Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships.

**Grade/Level:**

Grades 4-5

**Duration/Length:**

3 days (60 minutes each)

**Student Outcomes:**

Students will:

- Identify characteristics of 3-dimensional shapes.
- Identify the number of faces, vertices, and edges in 3-dimensional shapes.
- Compare and contrast prisms and pyramids.
- Apply knowledge of 3-dimensional shapes in order to identify its matching net.
- Apply knowledge of 3-dimensional shapes in order to identify solid figures in the real world.

**Materials and Resources:**

Day 1

- Student Resource Pinch Card
- Teacher Resource "Pinch Card"- Answer Key
- 4 sets of solid 3-dimensional shapes (cylinder, cube, rectangular prism, triangular prism, triangular pyramid, cone, square pyramid)
- Student Resource "All I Need to Know About Solid Figures" (copy front to back and fold to make a trifold)
- Teacher Resource "All I Need to Know About Solid Figures Answer Key"

- Student Resource “Solid Shape Search”
- Teacher Resource “Solid Shape Search”- Answer Key
- Student Resource “3-D Thinking Web”
- Chart Paper (optional)
- Teacher Resource “Day 1 Assessment” Answer Key- Riddles
- “Captain Invincible and the Space Shapes” by Stuart J. Murphy (ISBN : 0064467317)
- Teacher Resource “Captain Invincible T-Chart”

Day 2

- Feely Bag: (brown paper bag) one for each student- place one of the following shapes into the brown paper bag: triangular prism, rectangular prisms, rectangular pyramid, or triangular pyramid.
- Student Resource “Broken Buttons (copy front to back)
- Gumdrops (23 per student)
- Toothpicks (35 per student)
- Baggies (to place gumdrops and toothpicks before you pass them out to the student)
- Student Resource “Prisms vs. Pyramids” Venn Diagram
- Teacher Resource “Prisms vs. Pyramids”- Answer Key
- Teacher Resource “I Have, Who Has” Geometry Game
- Teacher Resource “I Have, Who Has” Geometry Game- Answer Key
- Student Resource “Prism vs. Pyramid Button Sort”
- Student Resource “Buttons”
- Teacher Resource “Prism vs. Pyramid Button Sort”- Answer Key

Day 3

- Student Resource “3D Scavenger Hunt”
- Student Resource “Net Exploration”
- Scissors
- Tape
- Student Resource “Nets” (do not copy front to back)
- Teacher Resource “3D/Net matching game”
- Chart Paper
- Student Resource “More Fun with Nets”
- Teacher Resource “More Fun with Nets” Answer Key
- Folding Geometric Shapes (optional) can be purchased at: http://www.etacuisenaire.com/catalog/product?deptId=&prodId=40818&q=nets
- Access to the internet (optional)
- Student Resource “Comet’s New Dog House”
- Teacher Resource “Comet’s New Dog House”- Answer Key
- Blank Paper
- Student Resource “Summative Assessment”
- Teacher Resource “Summative Assessment”-Answer Key

**Development/Procedures:**

**Day 1**

**Pre-assessment**

- Pinch Cards: Make 2 sided copies of Pinch Cards on card stock (shapes should match up on the front and back of the pinch card). Cut down the center. Laminate so they will last.
- How they work: after you "pose' a question the students will "pinch" their response and hold them up for you to see. By scanning the room you will be able to see which students have prior knowledge of solid figures.
- Distribute premade Pinch Cards to every student.
- ASK the following questions aloud to the class in order to assess their prior knowledge of solid figures.
    1. Which figure is made up of all square faces?
    2. Which figure is a cone?
    3. Which figure has no vertices?
    4. Which figure is composed of only triangular faces?
    5. Which figure has triangular and rectangular faces?

    An answer key provided

**Engagement**

Read the book "Captain Invincible and the Space Shapes" by Stuart J. Murphy. Either individually or as a class create a T-Chart based on teacher resource "Captain Invincible T-Chart". An answer key provided

**Exploration**

- Divide students into groups, each group of students will need a variety of 3-dimensional shapes (cylinder, cube, rectangular prism, triangular prism, triangular pyramid, cone, square pyramid). If you do not have solid figure sets available to you get creative by collecting real life examples of each.
- Distribute student resource "All I Need to Know about Solid Figures" to every student.
- Direct students to explore the properties and characteristics (for example number of faces, vertices, edges) of solid figures.
- Have students record their findings in Student Resource "All I Need to Know about Solid Figures".
- Instruct students to keep this resource activity for the explanation part of the lesson.

**Explanation**

- Together as a whole class review what the students discovered and recorded in their groups on the student resource "All I Need to Know about Solid Figures."

- Record their findings either on an overhead, chart paper, chalkboard, docu-cam, or Promethean board.
- Start with holding the cube. Ask the students the following questions:
  1. How many edges does this solid have?
  2. How many faces does this solid have?
  3. How many vertices does this solid have?
  4. What 2-dimensional shapes are used to create the faces of the solid?
- After the students have identified all the properties and characteristics of the cube, have the students name the solid.
- Continue asking the same questions for each solid (cylinder, rectangular prism, triangular prism, triangular pyramid, cone, square pyramid).
- Make sure the students record the name of each 3-dimensional figure and correct any errors in their booklets.

**Application**

- Students will apply their knowledge of solid figures by completing the student resource "Solid Shape Search". The students will color different solid figures according to their characteristics. Real world examples will be used to challenge students.

  On a separate sheet of paper students will choose one of the real world objects from the "Solid Shape Search" and use math vocabulary (faces/edges/vertices) in order to explain how they classified it. The students will also describe where they would find the object in the real-world. An answer key provided

**Differentiation**

Reteach

-Struggling students should be brought into a small group in order to review names and characteristics of 3-dimensional shapes. Use 3-dimensional objects from the explore activity and have students use their hands to count the number of edges, faces, and vertices by physically touching each solid.

Enrich- Using student resource "3-D Thinking Web," students will choose a 3-dimensional figure to describe, define, and list examples and non-examples of their chosen shape. This can be done with partners or independently. If working with a partner, have students display their thinking on large chart paper.

**Assessment**

Pose the following riddles to the class: (Allow students use of resources for help- (3-dimensional shapes and student resource "All I Need to Know about Solid Figures").

1. I have 6 edges, 4 faces, and 4 vertices. What am I?
2. I am made up of six square faces. What am I?
3. I am made of 2 triangles and 3 rectangles. What am I?
4. I have 1 square base and 4 triangular faces. What am I?
5. I am made up of 2 circles and 1 rectangle. I look like a can of soup. What am I?

Have the students write their responses on wipe boards or use pinch cards from pre-assessment. Be sure to observe which students are demonstrating understanding and which students are not.

**Day 2**

**Engagement**

"Feely Bag" Prior to the start of the lesson place one of the following shapes into a brown paper bag: triangular prism, rectangular prisms, rectangular pyramid, or triangular pyramid. Distribute the "Feely Bag" and Student Resource "Broken Buttons" to each student. Allow 4-5 minutes for students to explore the shape inside the bag using their sense of touch. Students should describe what they feel and predict which shape/ which button is inside the bag. Discuss students predictions stressing why they think they have the pyramid or prism. Have students place the "Feely Bag" and Student Resource "Broken Buttons" inside their desk to use later in the lesson.

**Exploration**

- Place 23 gum drops, 27 whole toothpicks, and 8 half toothpicks into the lunch baggies. Make as many as needed for your students. Provide a few extras in case some are short. This process does take some time.
- Ask the students:
    1. I want to build a rectangular prism using toothpicks and gumdrops.
    2. What polygons/faces make up a rectangular prism?
    3. How many gumdrops/vertices will I need?
    4. How many toothpicks/edges will I need? (Students should refer to student resource "All I Need to Know about Solid Figures" from yesterday).
    5. Ask the students to remove 8 gumdrops, 4 whole and 8 half toothpicks from the baggies. Guide through the following process: First, make the two square shapes using the half toothpicks connecting the gum drops with the toothpicks. There should be two separate squares. Next have the students place the remaining four toothpicks, one in each gum drop pointing straight up toward the ceiling. Last, you will take the remaining square and connect it to the top of the toothpicks that are pointing straight up.
- Allow students to explore creating a triangular prism, triangular pyramid, and square pyramid using the remaining gumdrops and toothpicks in their baggies.
- Ask students if they would be able to make a cone or cylinder using gumdrops and toothpicks (No, because you cannot bend toothpicks).

**Explanation**

- Using their solid figure models from the exploration, have students describe the similarities and differences of prisms and pyramids in the student resource "Prisms vs. Pyramids Venn Diagram".
- Have students turn to a partner and discuss their notes from their Venn diagrams.

- Allow students to add/change/delete information and share their findings with the entire class. *Copy student resource "Prisms vs. Pyramids Venn Diagram" on large chart paper/ overhead/ chalkboard/ Promethean Board in order to record class ideas or notes. An answer key provided

**Application**

- Students will apply their knowledge of prisms and pyramids by sorting a variety of solid shapes into different categories.
- Distribute student resource "Prism vs. Pyramids Button Sort" and student resource "Buttons" to each student. Each student will need a pair of scissors and glue.

  Students will cut out each solid figure from student resource "Buttons" and place it under the correct category. Circulate around the classroom to assess which students may need to be pulled into a smaller group for reteaching. An answer key provided

**Differentiation**

Reteach

- In small groups review the properties of prisms and pyramids using 3-dimensional examples and their student resource "Prisms vs. Pyramids Venn Diagrams".

Enrich

- *Teacher Tips: Print out the "I Have, Who Has" flashcards on card stock and laminate them so that they will last.

- Distribute the precut cards from student resource "I Have, Who Has" randomly to your students. Some students may get more than one card.
- The student with the *start card begins by reading the card aloud
- (example: I have scalene triangle. Who has a three sided polygon?).
- The student whose card comes next, will then read his/her card.
- (example: I have triangle. Who has a 9-sided polygon?)
- Students must listen for their turn and try not to break the chain.
- When the chain circles around to the first student, the game is over.

**Assessment**

Students will use their knowledge of prisms and pyramids to explain what solid figure is inside their bag. Have the students read the directions on the back of student resource "Broken Buttons. Cont." (paper from exploration). Students will need to feel inside their "Feely Bag" without looking in order to complete the task.

Wrap Up- Once all students have completed their letter to Captain Invincible, allow students to reach inside their bag, pull out, and look at their shape to verify their answer.

Have students circle whether or not they were correct on the bottom of their paper. Encourage class discussion to share the students' findings.

**Day 3**

**Engagement**

Distribute student resource "3D Scavenger Hunt" to each student. Students should be grouped into teams of 3-4. Students will walk around the building/classroom finding real world examples of 3-dimensional shapes. When everyone has completed the hunt, report back as a class to discuss your findings.

**Exploration/Explanation**

- Explain to students that a "net" is a diagram showing how the plane faces of a solid are joined to each other to form a 3-dimensional figure.
- Distribute student resource "Net Exploration". Go over the example net of the cylinder, using either a document camera or overhead projector. Discuss which shapes are used to create the cylinder (2 circles and 1 rectangle) and how they are can be assembled into a cylinder (one circle on each side of the rectangle).
- Demonstrate how the net is folded into a cylinder by cutting out the net and pasting or taping the sides together. *Teacher tip: Because the nets have tabs on them have students highlight or color the shapes that are used to create the 3-dimensional shape. This reinforces their knowledge of which plane figures are needed to create a solid figure.
- Have the students predict which 3-dimensional shape can be made from each net on student resource "Net Exploration".
- After their predictions have been made, distribute student resource "Nets" to each student. Instruct students to cut out nets and paste/glue nets in order to make 3-dimensional shapes and verify predictions.
- * Teacher tip: You may choose whether or not to have each student make all the nets or just a few, depending on time.
- Have students check to see if their predictions were correct.
- As a class discuss each 3-dimensional figure and its net separately. Sample questions to ask:
    1. Which 2-dimensional plane figures are used in the net to create the solid?
    2. How are the 2-dimensional plane figures placed together in the net?
    3. Why are they placed the way they are in order to create the 3-dimensional shape?
    4. Is there only one way to make a net for a (cylinder/cube/pyramid)? *tell students they will explore this further in the enrichment section of this lesson to prove whether or not their predictions are correct

**Application**

- Using teacher resource "3D Shapes/Net Matching Game," -tape one figure/card onto the back of each student. Instruct the students not to look at the card on their backs!

- The students will use their knowledge of nets and the characteristics 3-dimensional shapes in order to find the classmate that has their matching net or 3-dimensional shape.
- Instruct the students to walk around the classroom asking their classmates **only yes or no** questions about the shape on their backs. Students must rotate around the room only asking one question per person. Example questions to be asked: "Is my shape 3-dimensional/2-dimensional?" "Am I made of (triangular/rectangular/circular/etc.) faces?" "Is my base shape a (triangle/rectangle/circle/square)?" "Do I have (#) of faces/edges/vertices?"
- Once students have found their partner/s ask them to sit down together.
- When everyone has found their matches, have students verify that they are correct by removing their partners' cards.
- Distribute chart paper to each group or/pair of students. Have them tape their cards on the paper and list reasons why they are matches.
- Allow time for students to share with the class their charts and their reasoning for why they know they are a match.
- Hang charts around the classroom to use as references.

**Differentiation**

Reteach

- Distribute student resource "More Fun with Nets" to each student. Students will match nets to their correct 3-dimensional shapes. Allow students to use their resources (foldable geometric shapes, foldable nets, charts around the room) to help them. Walk around the room and pull students who are struggling into a small group. Use examples of nets (Foldable Geometric Shapes and foldable nets) to show how they fold into 3-dimensional shapes and what polygons make up each 3-dimensional shape. An answer key provided.

Enrich

- Explore the variety of ways the net can be rearranged in order to make 3-dimensional figures. Distribute blank paper and allow students to explore drawing and creating their own nets. Allow students to cut and paste nets together in order to verify if their nets form 3-dimensional shapes. Discuss with the class why some nets worked to form 3-dimensional shapes and some did not.

Great Interactive Net Game:
http://www.sadlier-oxford.com/math/enrichment/gr4/EN0411b/EN0411b.htm

**Assessment**

Distribute student resource "Comet's New Dog House". Students will use their knowledge of nets and 3-dimensional shapes in order to identify the correct net. An answer key provided

**Summative Assessment**:

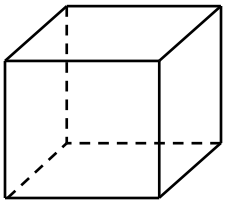
Distribute student resource “Summative Assessment” to each student to complete independently. Students will show their knowledge of the properties, characteristics of solid shapes, and their nets in order to identify and name 3-dimensional figures.

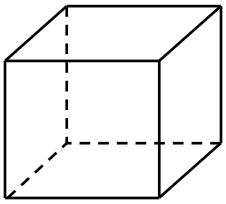
**Authors**:

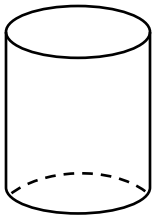

Meredith Driggs
Fullerton Elementary
Baltimore County Public Schools

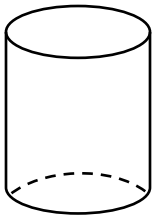
Jessica Hammel
William Paca/OPR Elementary
Harford County Public Schools

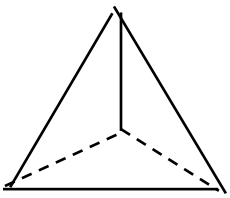
Pre-Assessment Pinch Cards

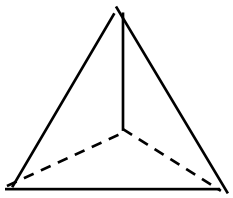


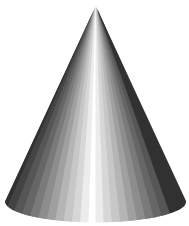


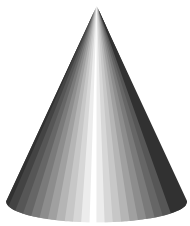


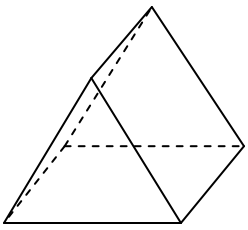


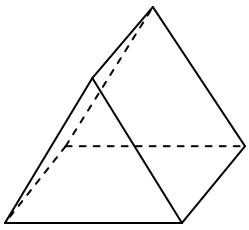








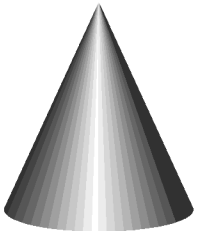




**Pre-assessment Answer Key**

1. Cube
2. Cone
3. Cylinder
4. Triangular Pyramid
5. Triangular Prism

**Name: _____**



**# of faces: _____**

**# of edges: _____**

**# of vertices: _____**

# All I Need to Know About Solid Figures

Name _____

**Directions:**

With your group, explore the 3-dimensional shapes/solid figures in front of you. Write down your observations under the appropriate shape.

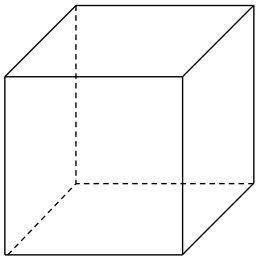
**Remember Your Vocabulary**

**Face**: polygon that makes up a solid figure

**Edge**: line segment that connects two faces

**Vertex (vertices):** point where three or more edges meet

**Name: _____**

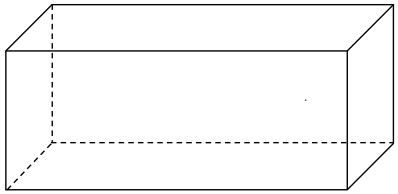


**# of faces: _____**

**# of edges: _____**

**# of vertices: _____**

**Name: _____**

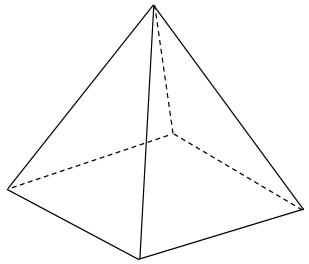


**# of faces: _____**

**# of edges: _____**

**# of vertices: _____**

**Name: _____**

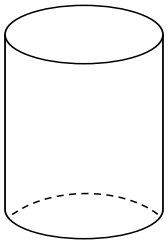


**# of faces: _____**

**# of edges: _____**

**# of vertices: _____**

**Name: _____**

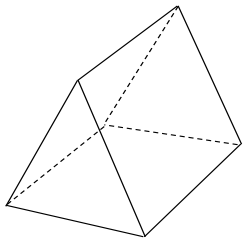


**# of faces: _____**

**# of edges: _____**

**# of vertices: _____**

**Name: _____**

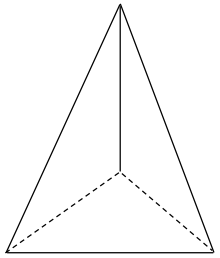


**# of faces: _____**

**# of edges: _____**

**# of vertices: _____**

**Name: _____**

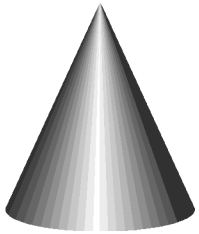


**# of faces: _____**

**# of edges: _____**

**# of vertices: _____**

**Name: Cone**



**# of faces: 1**

**# of edges: 0**

**# of vertices: 1**

# All I Need to Know About Solid Figures

# ANSWER KEY

Name _____

**Directions:**

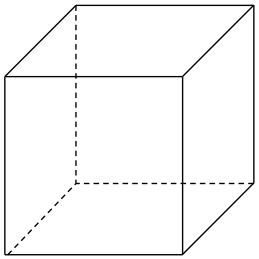
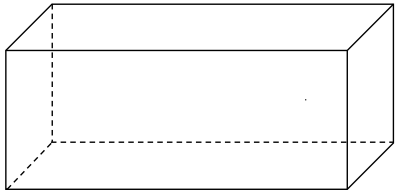
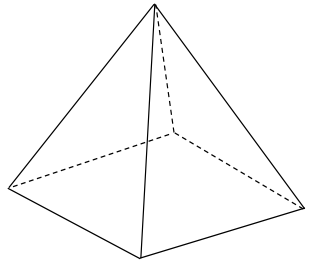
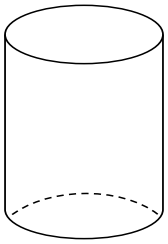
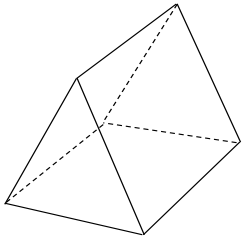
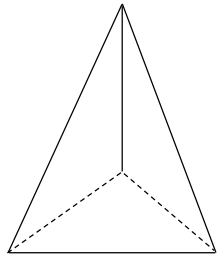
With your group, explore the 3-dimensional shapes/solid figures in front of you. Write down your observations under the appropriate shape.

**Remember Your Vocabulary**

**Face**: polygon that makes up a solid figure

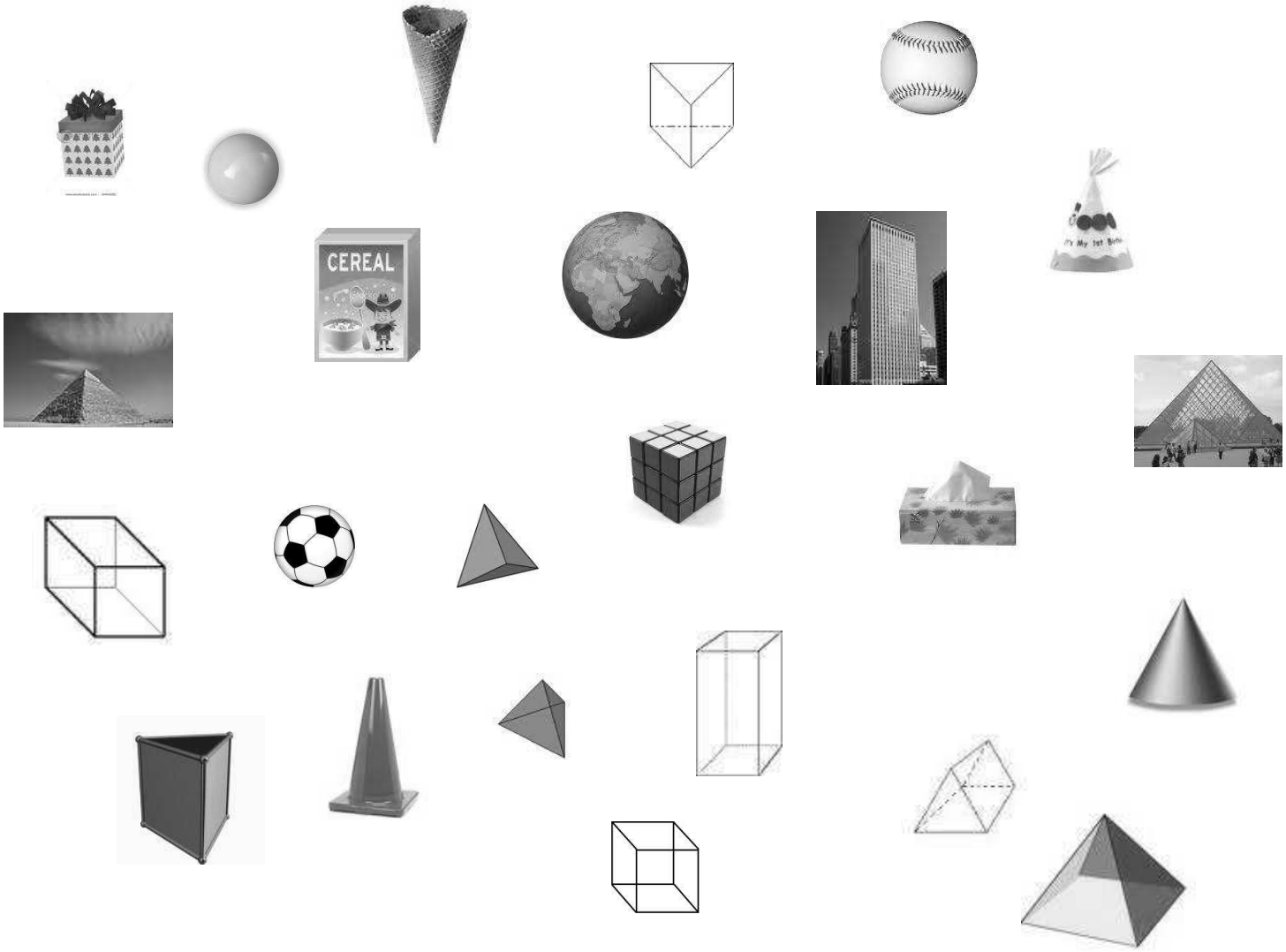
**Edge**: line segment that connects two faces

**Vertex (vertices):** point where three or more edges meet

| | | |
|---|---|---|
| **Name: Cube**<br>  <br>**# of faces: 6**<br>**# of edges: 12**<br>**# of vertices: 8** | **Name: Rectangular Prism**<br>  <br>**# of faces: 6**<br>**# of edges: 12**<br>**# of vertices: 8** | **Name: Rectangular Pyramid**<br>  <br>**# of faces: 5**<br>**# of edges: 8**<br>**# of vertices: 5** |
| **Name: Cylinder**<br>  <br>**# of faces: 3**<br>**# of edges: 0**<br>**# of vertices: 0** | **Name: Triangular Prism**<br>  <br>**# of faces: 5**<br>**# of edges: 9**<br>**# of vertices: 6** | **Name: Triangular Pyramid**<br>  <br>**# of faces: 4**<br>**# of edges: 6**<br>**# of vertices: 4** |

Name: _____

# Solid Shape Search




## Directions

1. Identify each solid figure according to its number of faces, edges, and vertices.

2. Color each figure according to these characteristics:

**Rectangular Pyramid = Red** **Rectangular Prism = Blue**
**Triangular Pyramid = Green** **Triangular Prism = Orange**
**Sphere = Purple** **Cube = Brown** **Cone = Yellow**

3. On a separate sheet of paper, choose one of the real-world objects from above and explain how you classified it. Make sure to use math vocabulary in your explanation (faces, edges, vertices). Describe where you would find this object in the real-world.

# Solid Shape Search Answer Key

The solid figures should be colored the following amount of times:

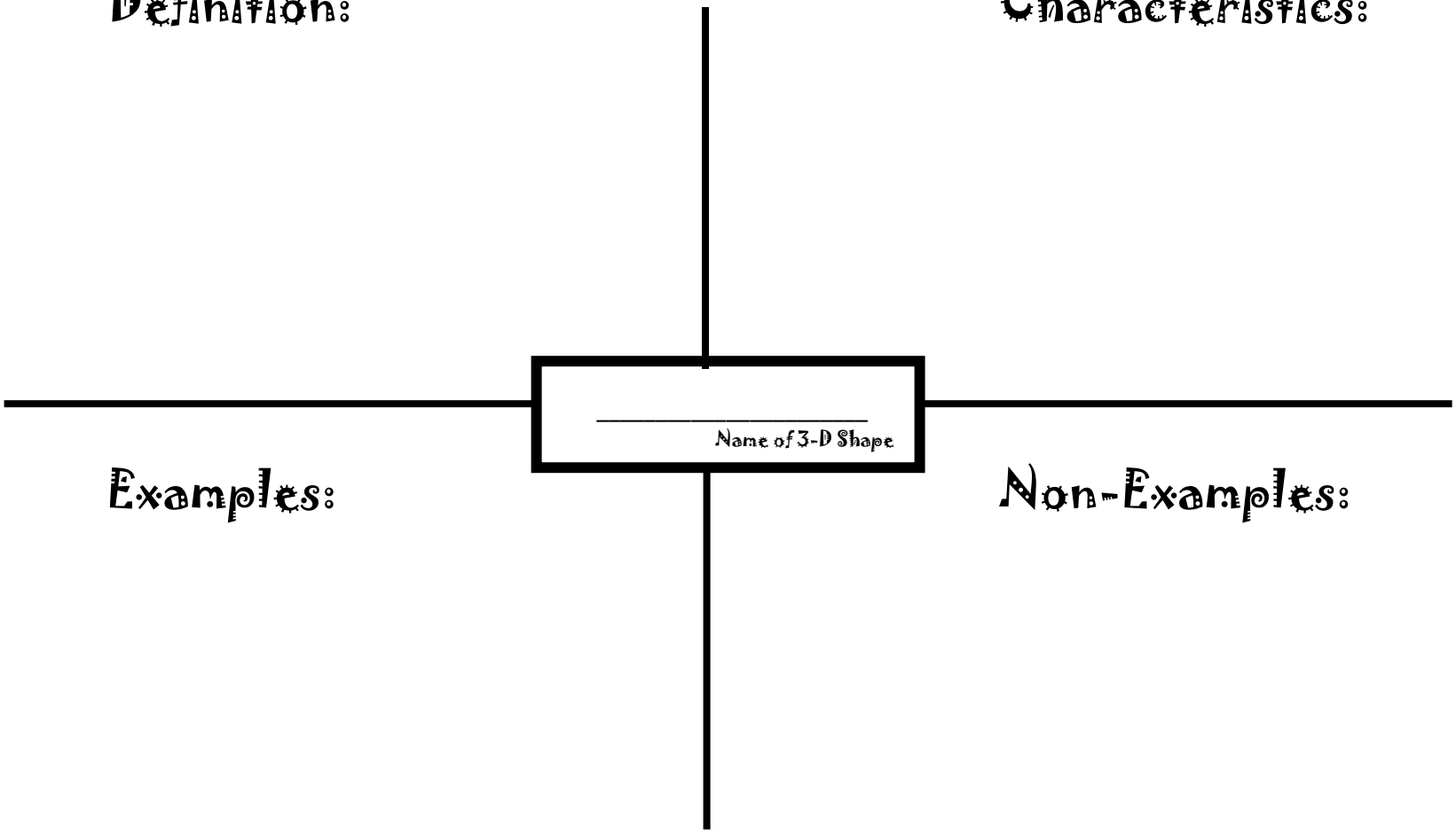
Rectangular Pyramid = 3
Rectangular Prism = 8 (including the cubes)
Triangular Pyramid = 2
Triangular Prism = 3
Sphere = 4
Cube = 3
Cone = 4

Separate Sheet of Paper: Answers will vary. Check for accuracy of solid figure description, number of faces, edges, & vertices, as well as if the student accurately described where they would find this shape in the real-world.

# 3-D Thinking Web

Definition:

Characteristics:




Examples:

Non-Examples:

# Day 1 Assessment Answer Key – Riddles

1. I have 6 edges, 4 faces, and 4 vertices = Triangular Pyramid
2. I am made up of 6 square faces = Cube
3. I am made up of 2 triangles and 3 rectangles = Triangular Prism
4. I have 1 square base and 4 triangular faces = Square Pyramid
5. I am made up of 3 plane figures: two circles and one rectangle. I look like a can of soup. = Cylinder

# Captain Invincible & Comet's Space Shapes

| What 3-D Shapes did you see? | How were they being used? |
| --- | --- |
| | |

Answers will vary.

Some examples include:

| | |
| --- | --- |
| Sphere | Captain Invincible & Comet's Helmets |
| Cube & Square Pyramid | Buttons on spaceship |
| Cones | Inside Space Ship on control panel |
| Sphere | Planets |
| Rectangular Prism | Handles on the Spaceship Wall |

Name: _____

# Broken Buttons

Two of the buttons on Captain Invincible's spaceship broke. One of them was a prism, the other a pyramid. New buttons were sent to replace them; however, the company forgot to label the bags!

1. Feel inside the bag to figure out which of the buttons you have.
2. Describe your solid figure using math vocabulary (faces, edges, vertices).
3. Predict which spaceship button is inside your bag using the information you gathered.

**Remember, don't look inside the bag!**

Description: _____

_____

_____

_____

_____

Circle which type of button you think you have:

**Prism** **Pyramid**

# Broken Buttons Cont.

Now that you are an expert on prisms and pyramids, it is time to help Captain Invincible fix his spaceship. Captain Invincible needs a new RECTANGULAR PYRAMID button and a new TRIANGULAR PRISM button. Can you help Captain Invincible fix his spaceship?

Write a note to Captain Invincible explaining to him:

1. The name of the button inside your bag – pyramid or prism.
2. How you know it is a pyramid or a prism (describe side faces).
3. How you know what TYPE of pyramid or prism you have (describe the base/s).
4. Whether your button will help Captain Invincible fix his spaceship.

Dear Captain Invincible,

Your Friend,

_____

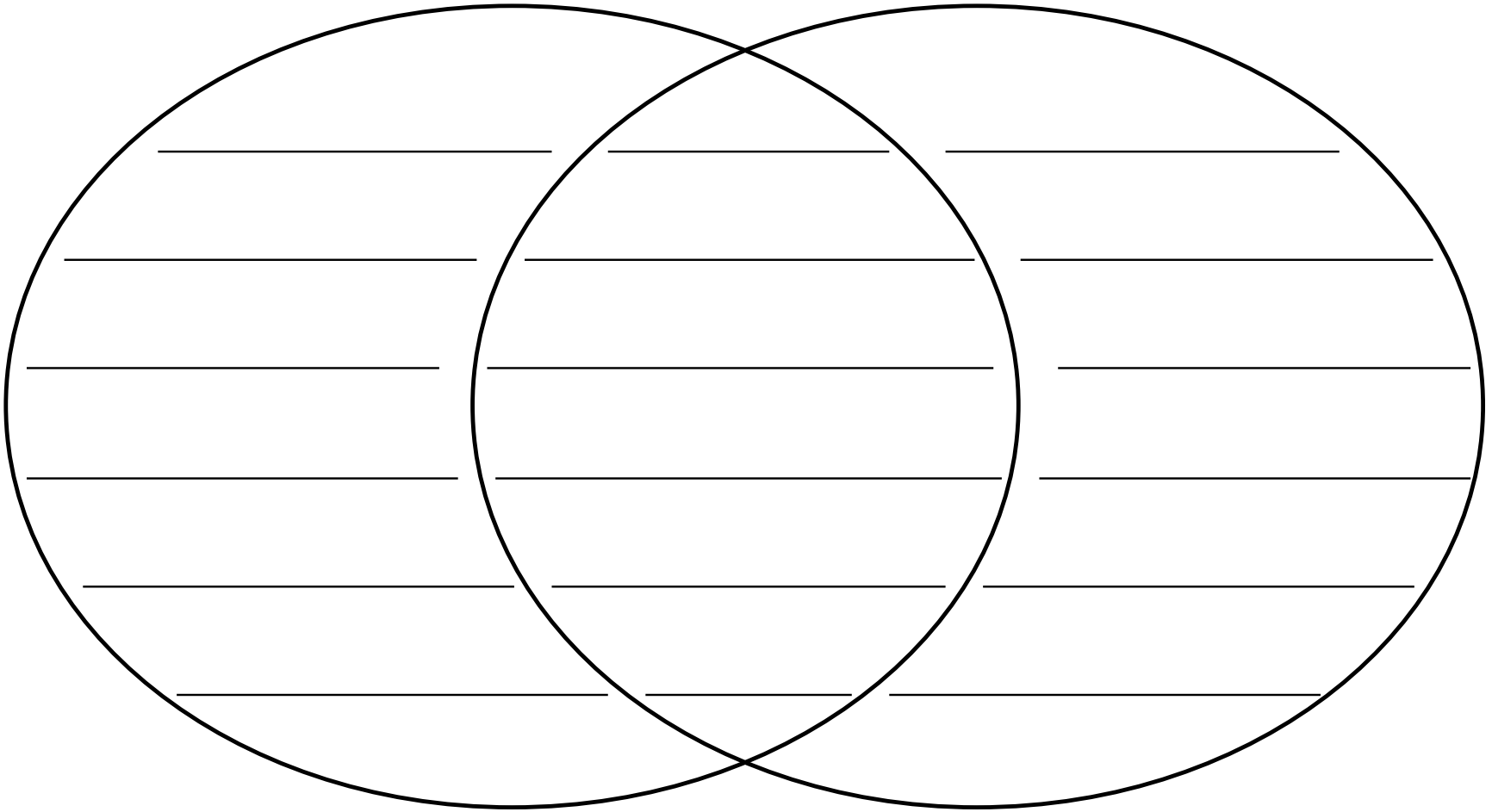
Was your prediction right? Did you describe the button correctly?

**YES** **NO**

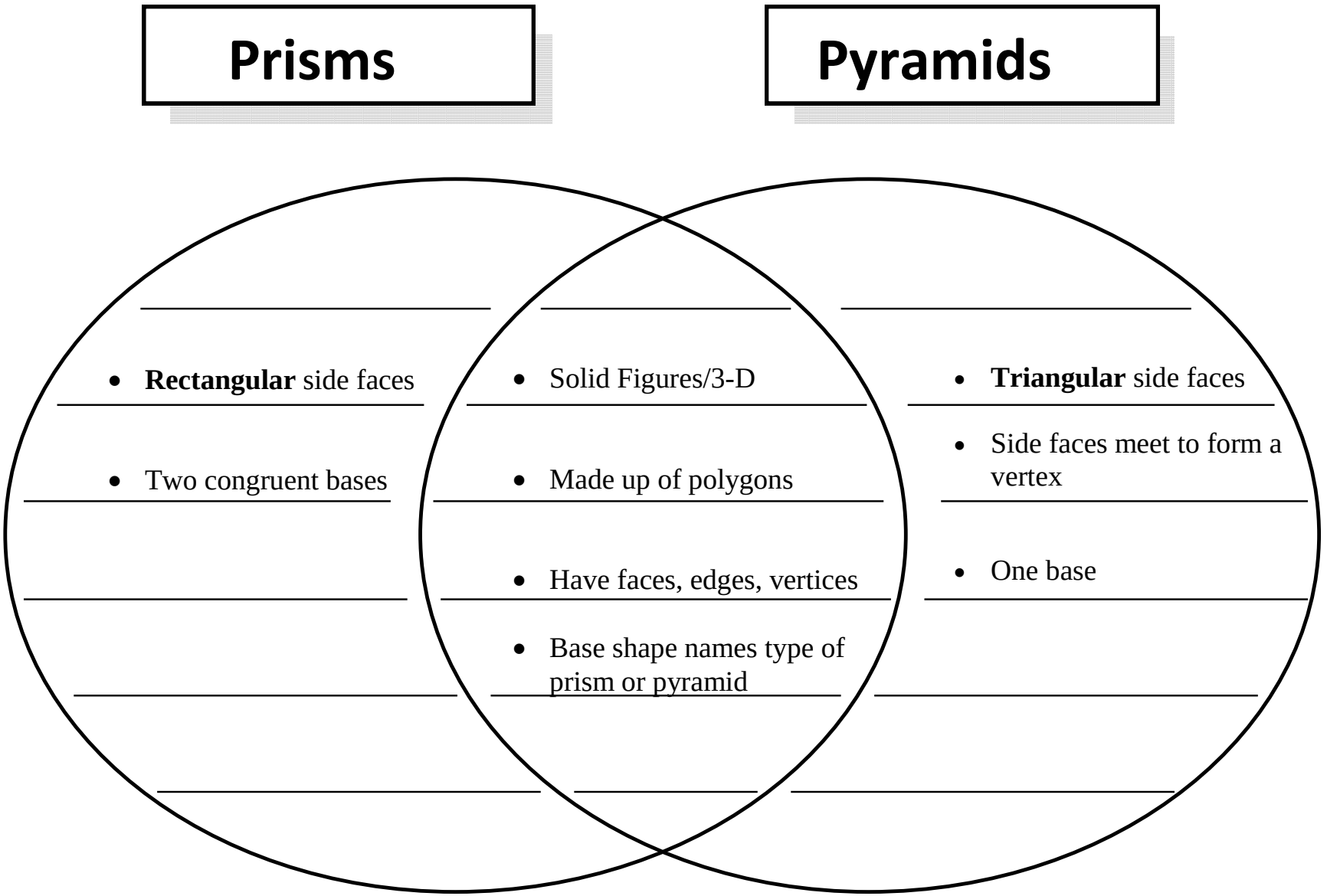
Name_____ Date_____

**Prisms**

**Pyramids**



Name_____ Date_____




* Sample answers.

| | |
|---|---|
| **I have**…<br>SCALENE TRIANGLE | **Who has** … a 3-sided polygon? |
| **I have**…<br>TRIANGLE | **Who has**…a 9-sided polygon? |
| **I have**…<br>NONAGON | **Who has**…a quadrilateral with opposite sides parallel and congruent? |
| **I have** …<br>PARALLELOGRAM | **Who has**…figures with exactly the same shape and same size? |
| **I have** …<br>CONGRUENT FIGURES | **Who has**…an angle of exactly 90 degrees? |
| **I have**…<br>RIGHT ANGLE | **Who has**…the lines which intersect to form 90 degree angles? |
| **I have**…<br>PERPENDICULAR LINES | **Who has**… a polygon with 5 sides? |

| | |
|---|---|
| **I have**…<br>PENTAGON | **Who has**…the point where 2 sides or 3 faces meet? |
| **I have**…<br>VERTEX | **Who has**…the line which divides a figure with both sides looking the same? |
| **I have**…<br>SYMMETRY | **Who has**…the flat surface on a 3-dimensional figure? |
| **I have**…<br>FACE | **Who has** … the area where 3 faces meet on a 3-dimensional figure? |
| **I have**…<br>EDGE | **Who has**…a 3-dimensional figure with 6 faces that are all squares? |
| **I have** …<br>CUBE | **Who has**…the type of angle with more than 90 degrees? |
| **I have**…<br>OBTUSE ANGLE | **Who has**…an 8 sided polygon? |

| | |
|---|---|
| **I have**…<br>OCTAGON | **Who has**…a 3-dimensional figure that has rectangles and squares as the faces? |
| **I have**…<br>RECTANGULAR PRISM | **Who has**…the type of angle that is less than 90 degrees? |
| **I have**…<br>ACUTE ANGLE | **Who has**…a 3-dimensional shape with a curved surface and an apex? |
| **I have**…<br>CONE | **Who has**…a rectangle with 4 congruent sides? |
| **I have** …<br>SQUARE | **Who has**…a 3-dimensional figure with 5 faces? The side faces are triangles and the base is a square? |
| **I have**…<br>SQUARE PYRAMID | **Who has**…a polygon with 6 sides? |

| | |
|---|---|
| **I have** …<br>HEXAGON | **Who has**…a 3-dimensional figure that has only a curved surface? |
| **I have**…<br>SPHERE | **Who has**… a set of lines that never intersect or cross? |
| **I have**…<br>PARALLEL LINES | **Who has**… a triangle with 2 sides that are congruent? |
| **I have**…<br>ISOSCELES TRIANGLE | **Who has**…a 10 sided polygon? |
| **I have**…<br>DECAGON | **Who has**… a parallelogram with all sides congruent? |
| **I have**…<br>RHOMBUS | **Who has**… a quadrilateral with one set of parallel sides? |
| **I have**…<br>TRAPEZOID | **Who has**… a triangle with all sides of different lengths? |

# I Have, Who Has? Answer Key

| | |
|---|---|
| I have…<br>SCALENE TRIANGLE | Who has … a 3 sided polygon? |
| I have…<br>TRIANGLE | Who has…a 9-sided polygon? |
| I have…<br>NONAGON | Who has…a quadrilateral with opposite sides parallel and congruent? |
| I have …<br>PARALLELOGRAM | Who has…figures with exactly the same shape and same size? |
| I have …<br>CONGRUENT FIGURES | Who has…an angle of exactly 90 degrees? |
| I have…<br>RIGHT ANGLE | Who has…the lines which intersect to form 90 degree angles? |
| I have…<br>PERPENDICULAR LINES | Who has… a polygon with 5 sides? |
| I have…<br>PENTAGON | Who has…the point where 2 sides or 3 faces meet? |
| I have…<br>VERTEX | Who has…the line which divides a figure with both sides looking the same? |
| I have…<br>SYMMETRY | Who has…the flat surface on a 3-dimensional figure? |
| I have…<br>FACE | Who has … the area where 3 faces meet on a 3-dimensional figure? |
| I have…<br>EDGE | Who has…a 3-dimensional figure with 6 faces that are all squares? |
| I have …<br>CUBE | Who has…the type of angle with more than 90 degrees? |
| I have…<br>OBTUSE ANGLE | Who has…an 8 sided polygon? |

| | |
|---|---|
| I have…<br>OCTAGON | Who has…a 3-dimensional figure that has rectangles and squares as the faces? |
| I have…<br>RECTANGULAR PRISM | Who has…the type of angle that is less than 90 degrees? |
| I have…<br>ACUTE ANGLE | Who has…a 3-dimensional shape with a curved surface and an apex? |
| I have…<br>CONE | Who has…a rectangle with 4 congruent sides? |
| I have …<br>SQUARE | Who has…a 3-dimensional figure with 5 faces? The side faces are triangles and the base is a square? |
| I have…<br>SQUARE PYRAMID | Who has…a polygon with 6 sides? |
| I have …<br>HEXAGON | Who has…a 3-dimensional figure that has only a curved surface? |
| I have…<br>SPHERE | Who has… a set of lines that never intersect or cross? |
| I have…<br>PARALLEL LINES | Who has… a triangle with 2 sides that are congruent? |
| I have…<br>ISOSCELES TRIANGLE | Who has…a 10 sided polygon? |
| I have…<br>DECAGON | Who has… a parallelogram with all sides congruent? |
| I have…<br>RHOMBUS | Who has… a quadrilateral with one set of parallel sides? |
| I have…<br>TRAPEZOID | Who has… a triangle with all sides of different lengths? |

# Prism vs. Pyramid Button Sort

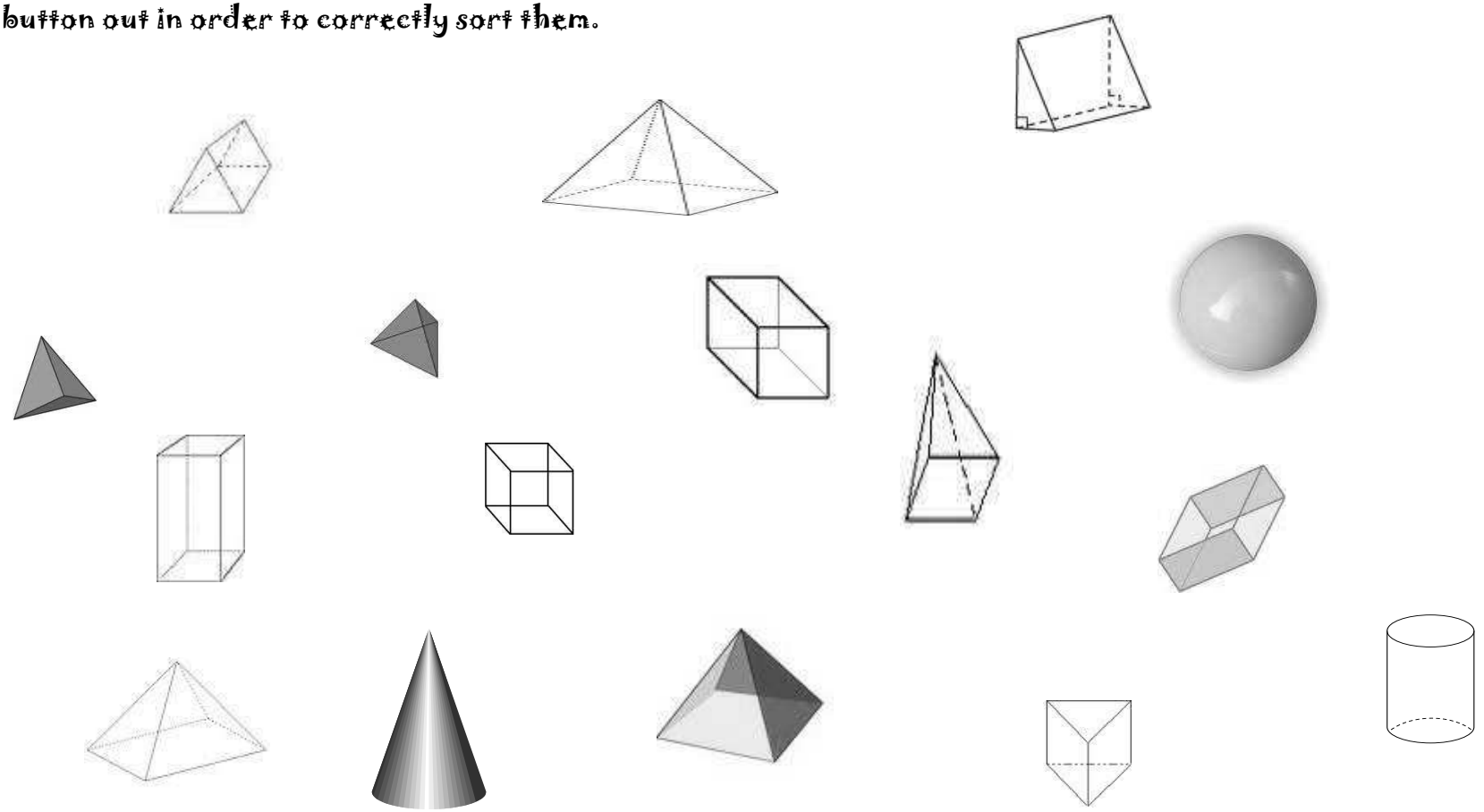
Help Captain Invincible sort the buttons. Cut each button out and glue it in the correct box.

| Prisms | Pyramids | Neither |
| --- | --- | --- |
| | | |

Name: _____

# Buttons

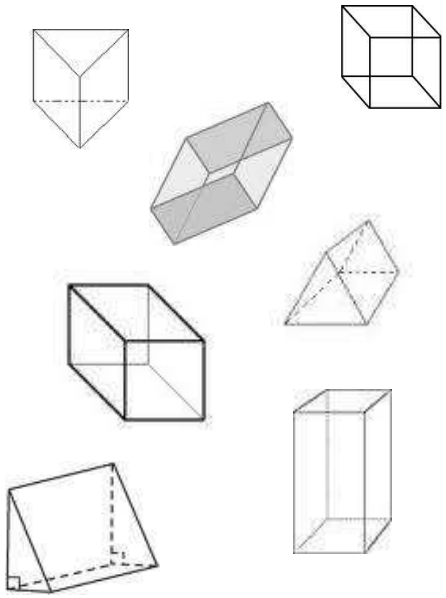
Cut each button out in order to correctly sort them.



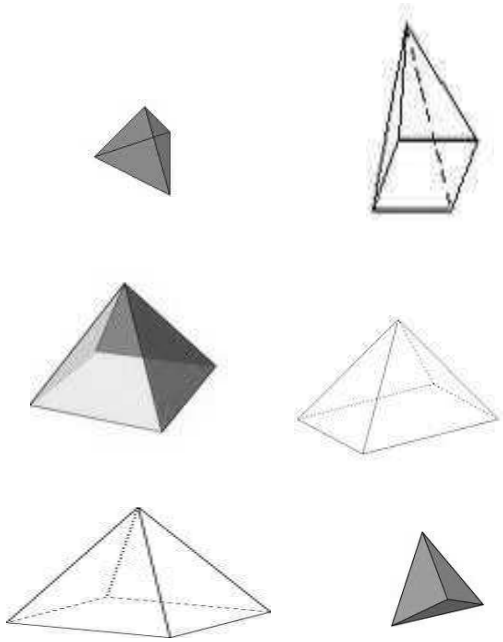
# Prism vs. Pyramid Button Sort- Answer Key

Help Captain Invincible sort the buttons. Cut each button out and glue it in the correct box.

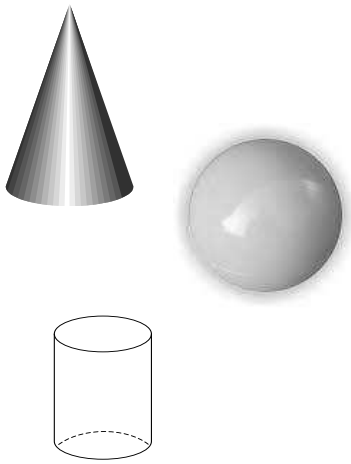
## Prisms



## Pyramids



## Neither

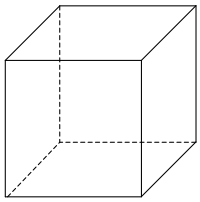


# 3-D Scavenger Hunt

Captain Invincible loves 3-dimensional shapes. - His spaceship is filled with them! In fact, 3-dimensional shapes are all around us. See if you can find examples of 3-D shapes inside your school.

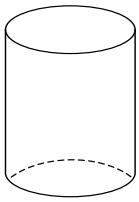
On your hunt, find one example of each 3-D shape shown below. Check off each shape once you have discovered an example of it. Be sure to write down the real-world example on the lines below.

☐



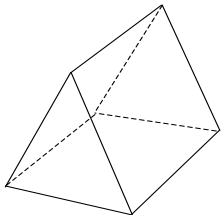
What we found: _____

☐



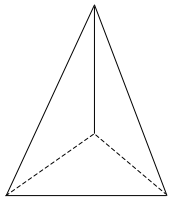
What we found: _____

☐



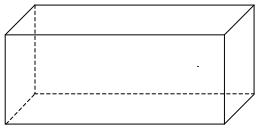
What we found: _____

☐



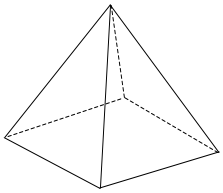
What we found: _____

☐



What we found: _____

☐

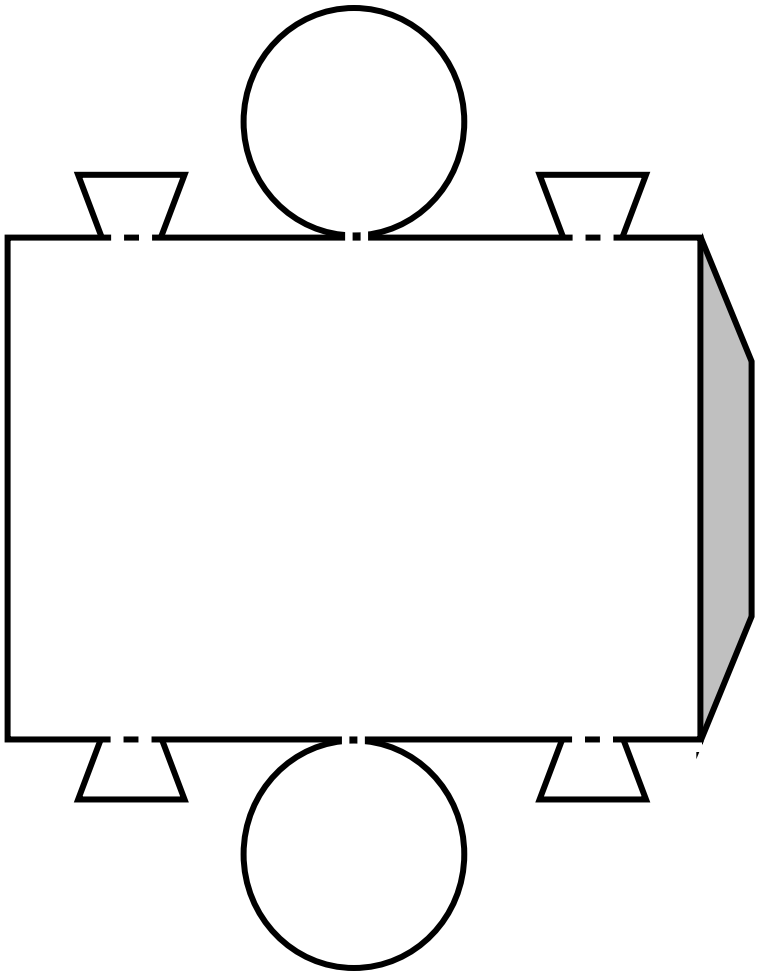


What we found: _____

# Net Exploration

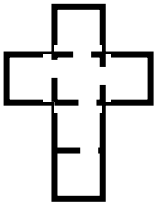
A "net" is a diagram showing how the plane faces of a solid figure are joined together to form a 3-dimensional figure.

The following is an example of the net of a cylinder:

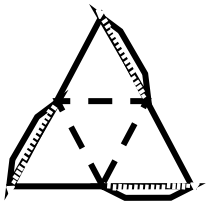


Predict which 3-dimensional shape is created when the following nets are folded.

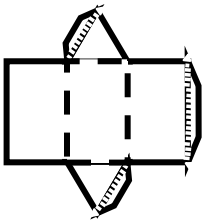
**Prediction**



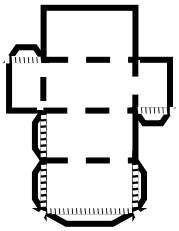
_____



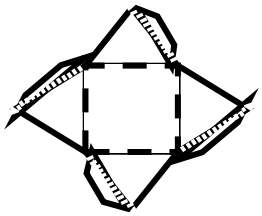
_____



_____

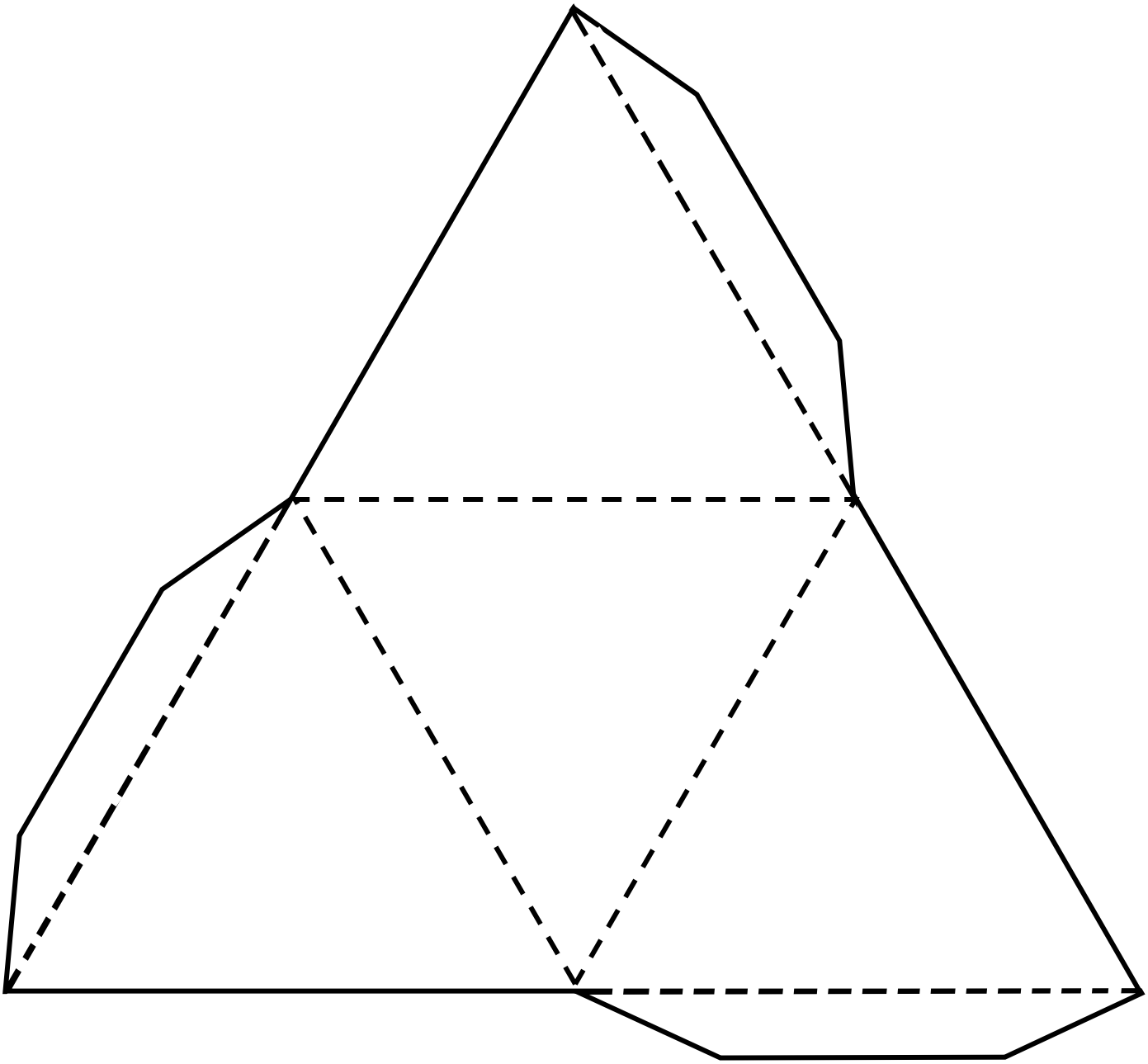


_____

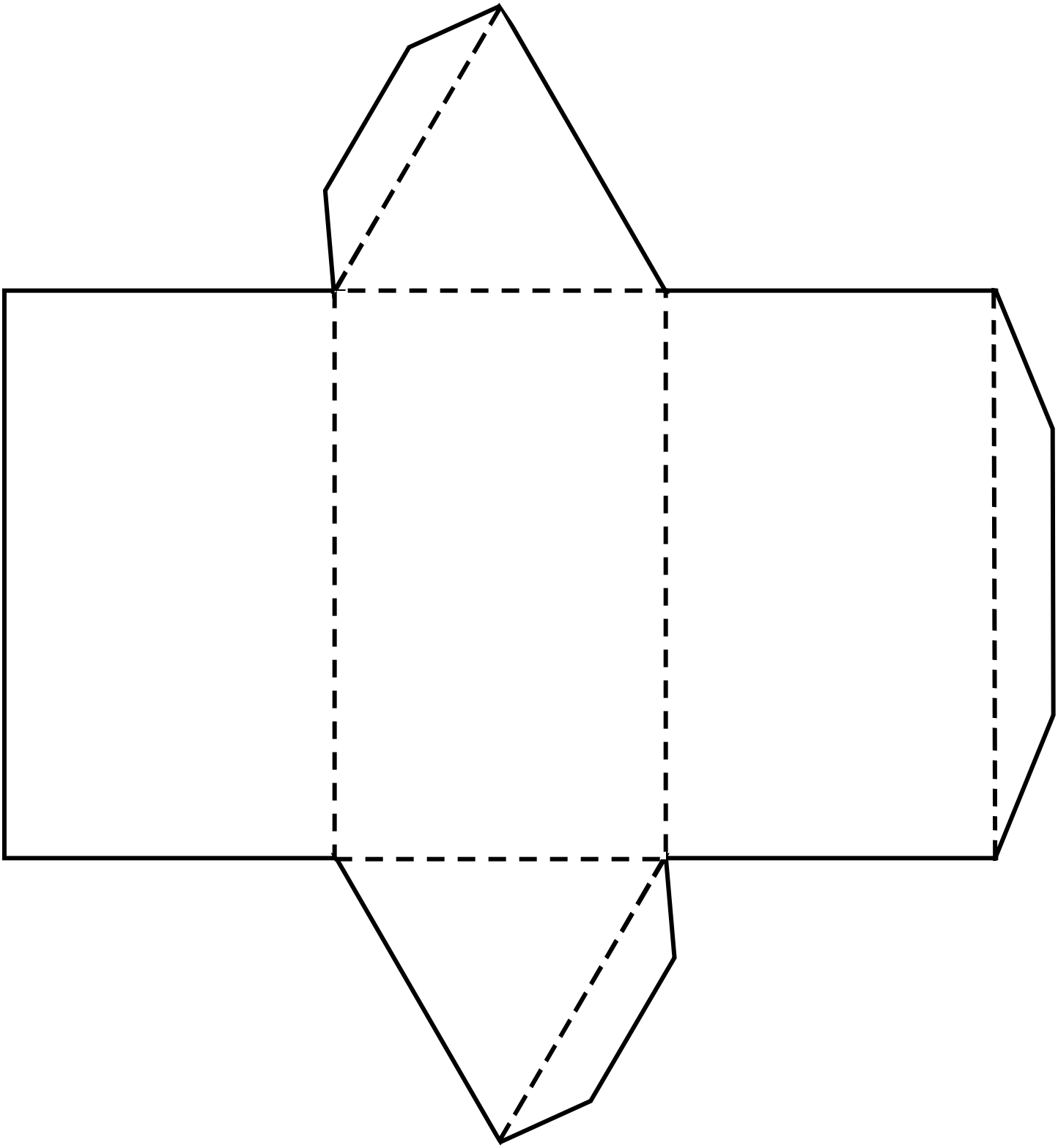


_____

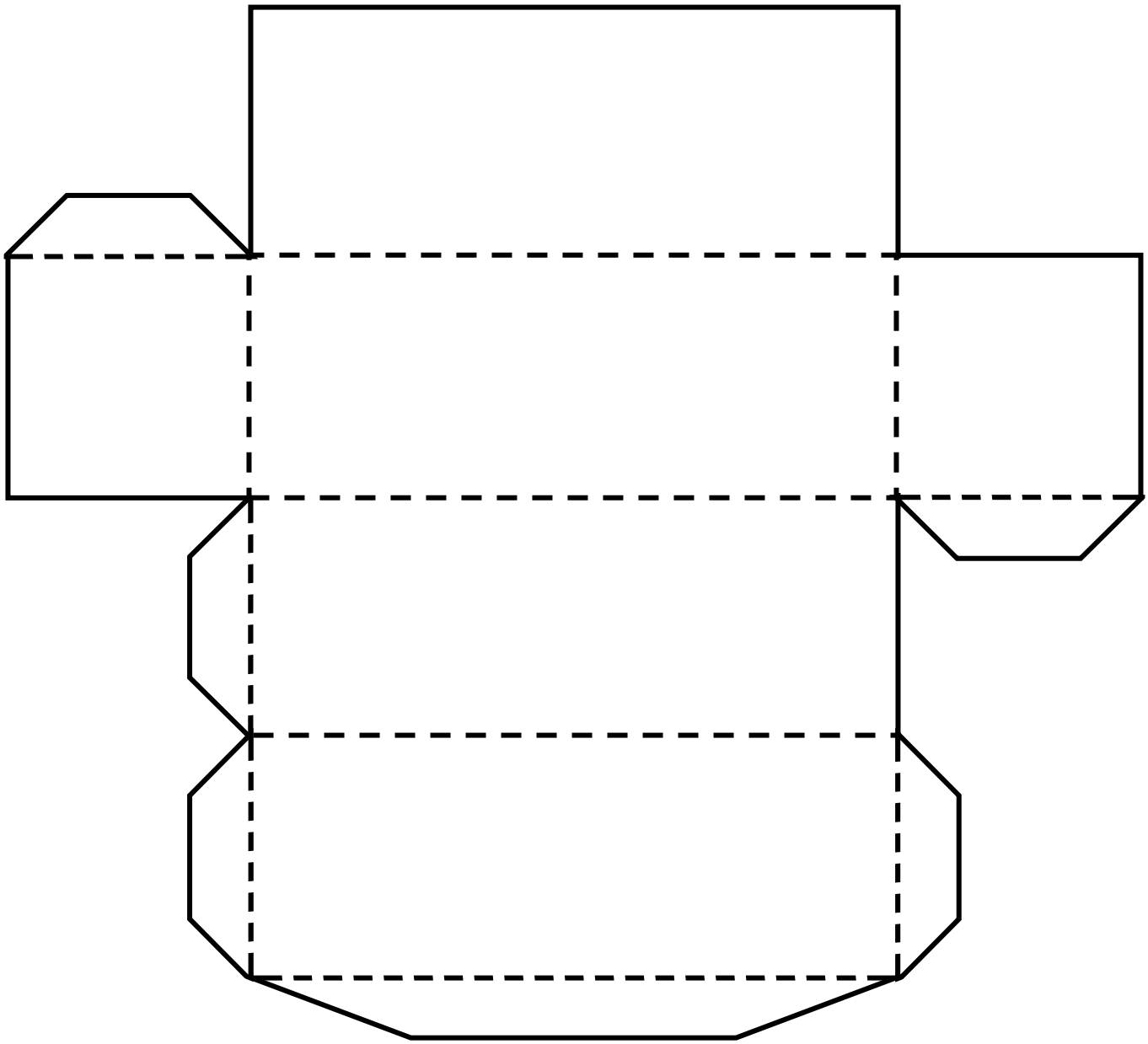
# Nets



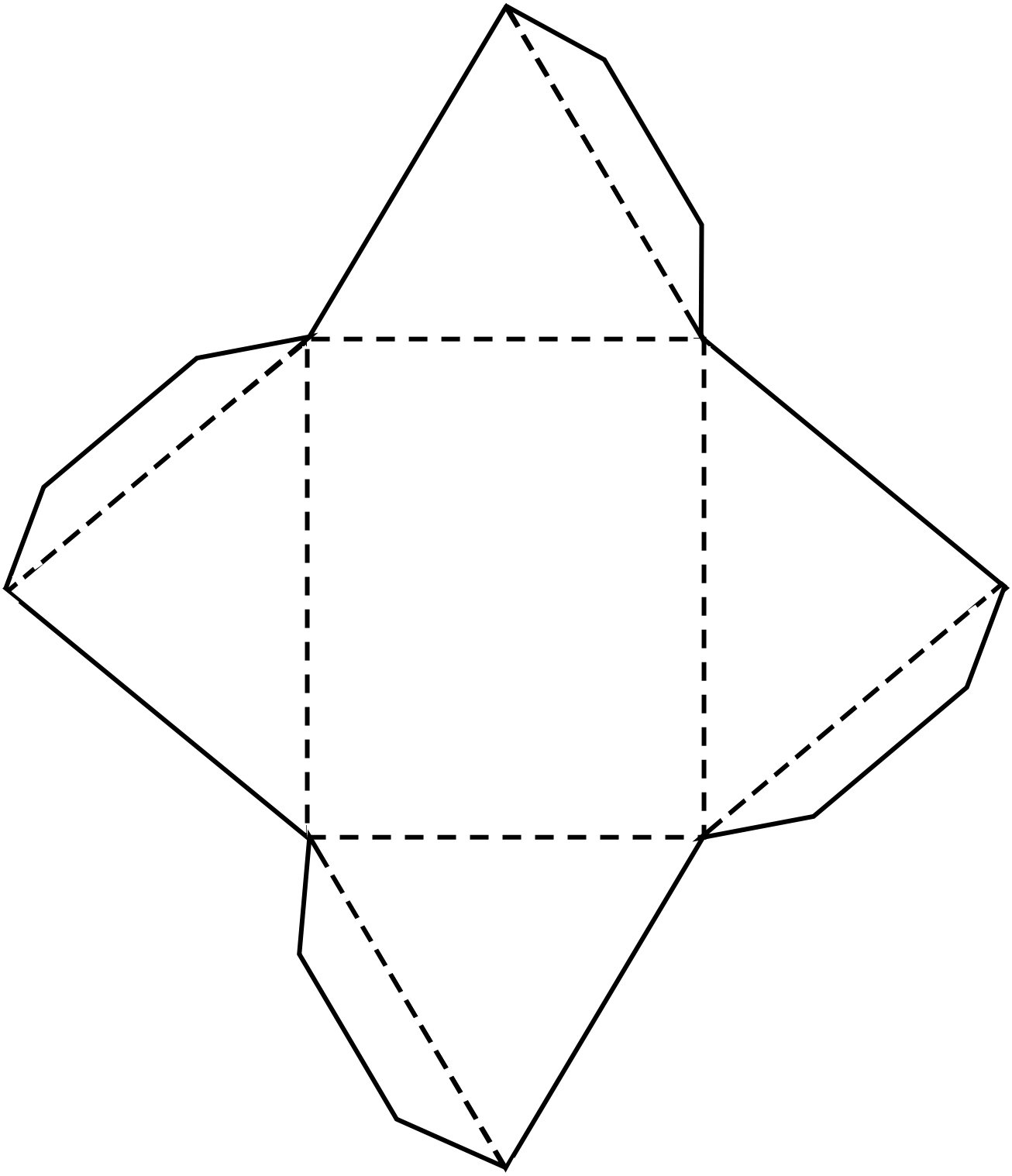
# Nets



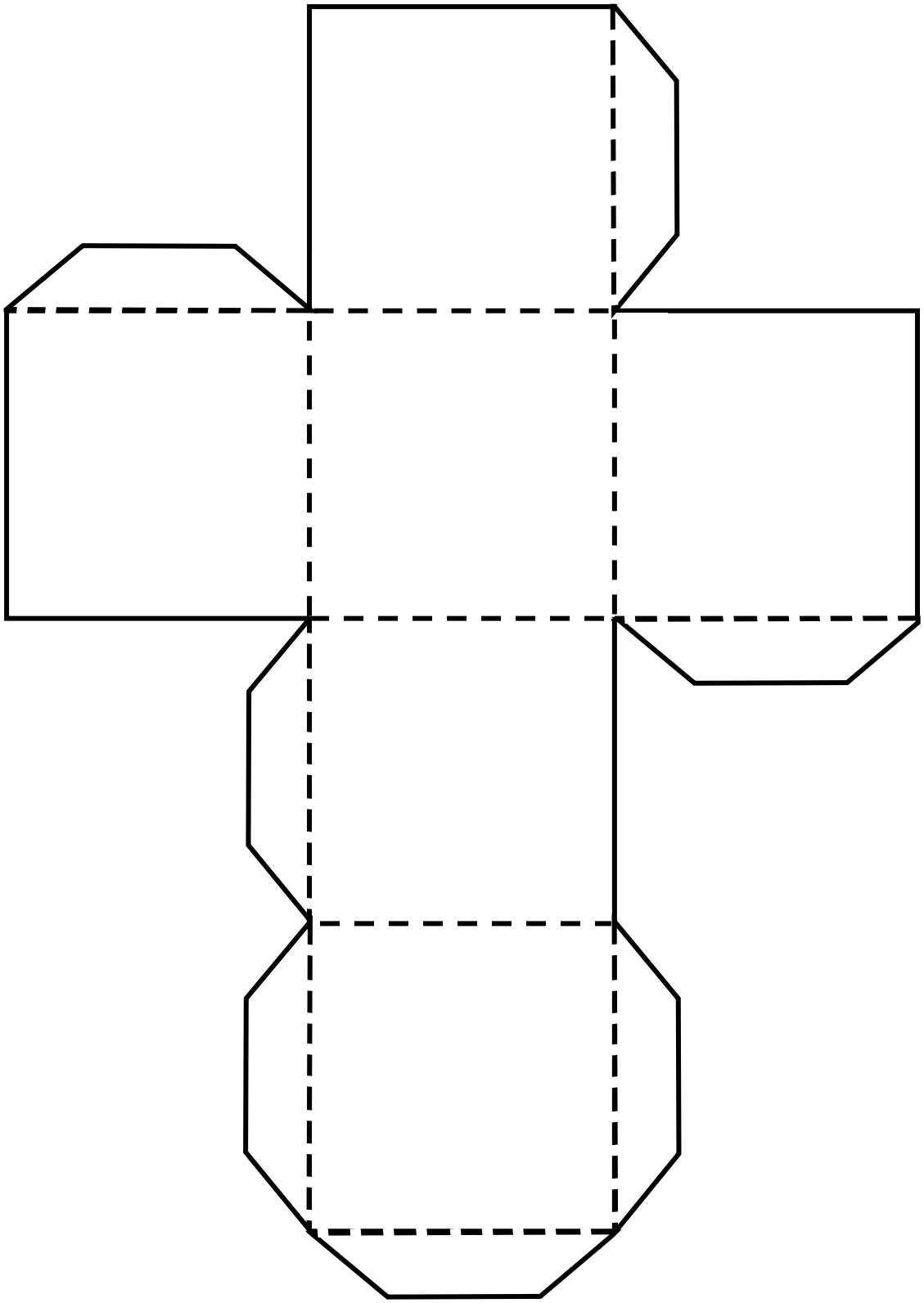
# Nets



# Nets

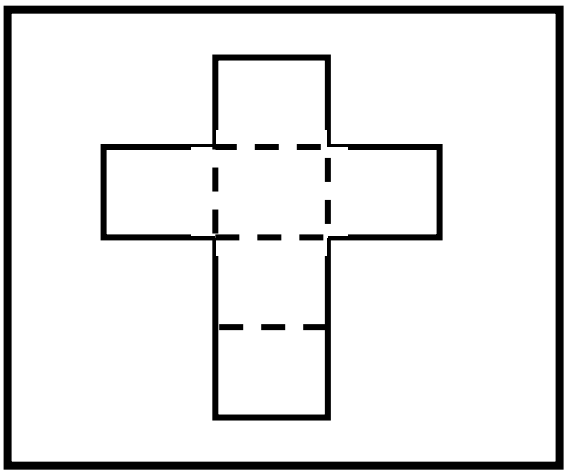


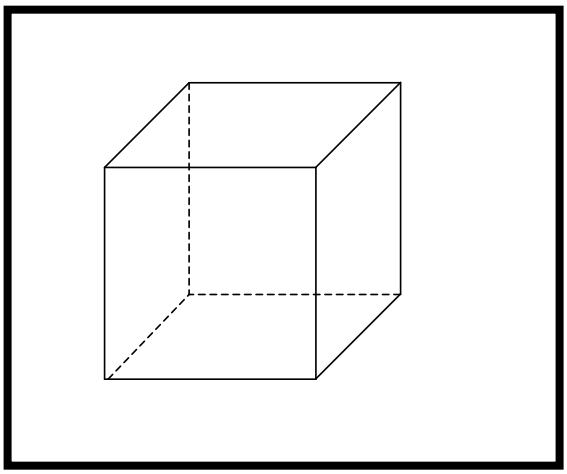
# Nets

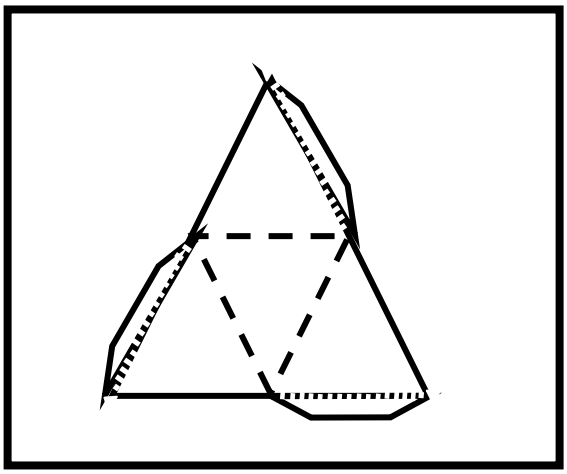


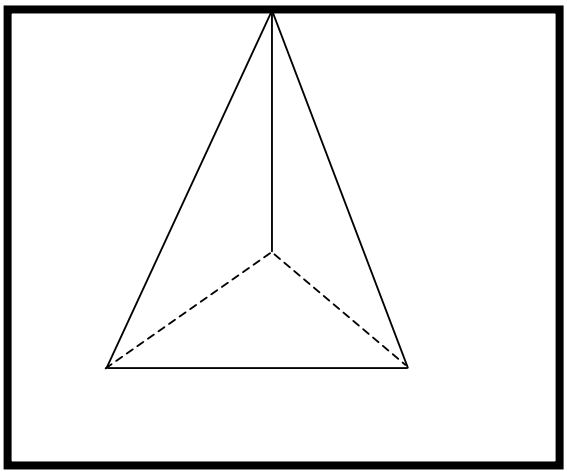
# 3-D Shapes/Nets Matching Game

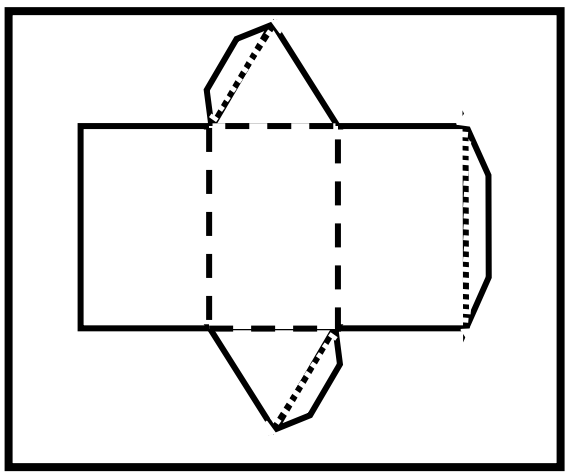
Cut the following cards out. Be sure to make enough copies so that each student in your class has a card. (Some of the shapes/nets will be used more than once depending on class size).

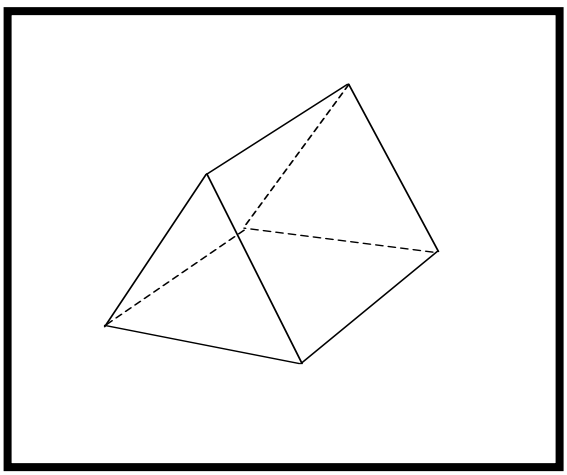


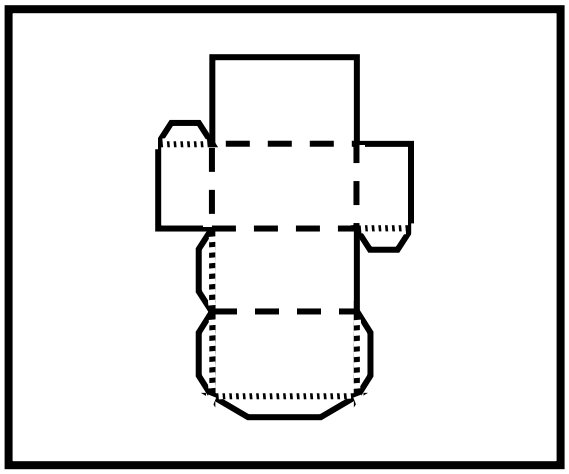


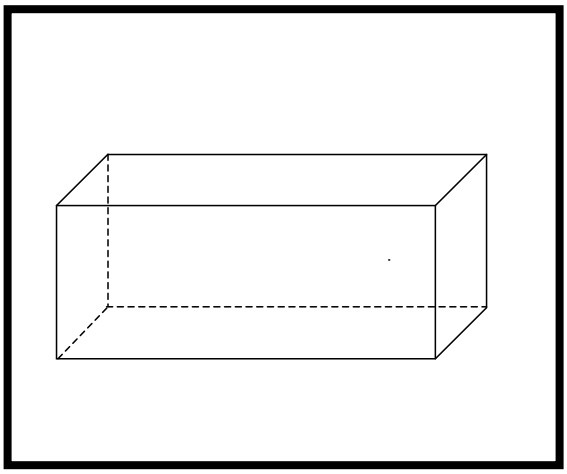


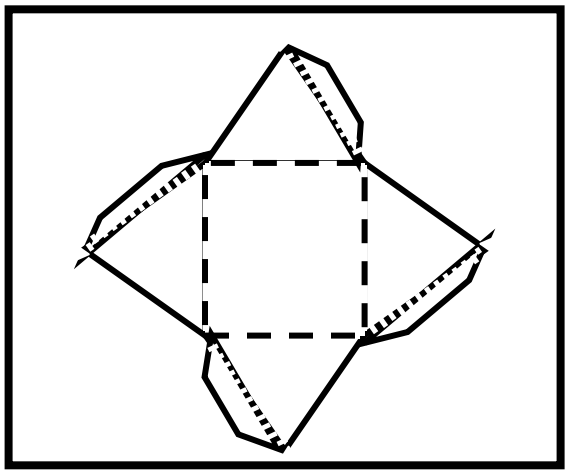


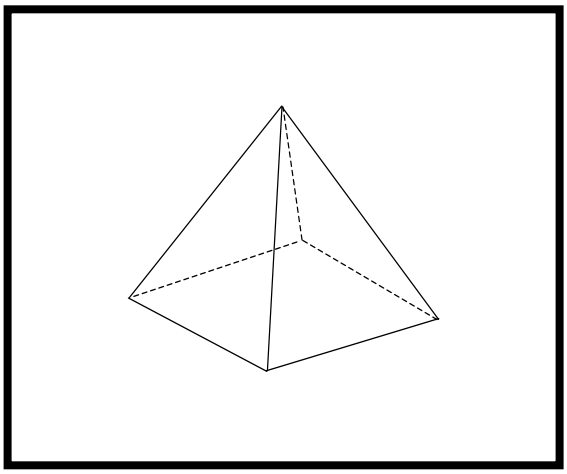


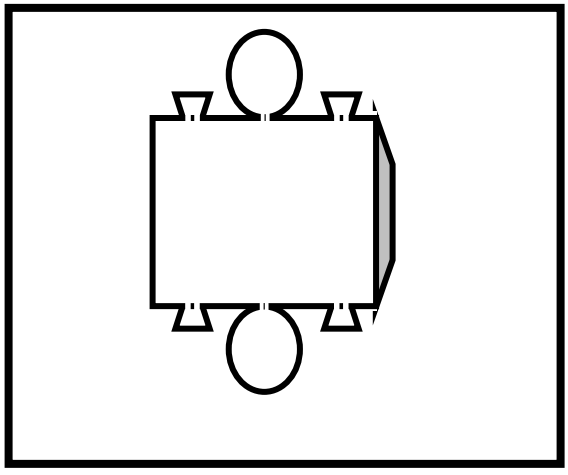


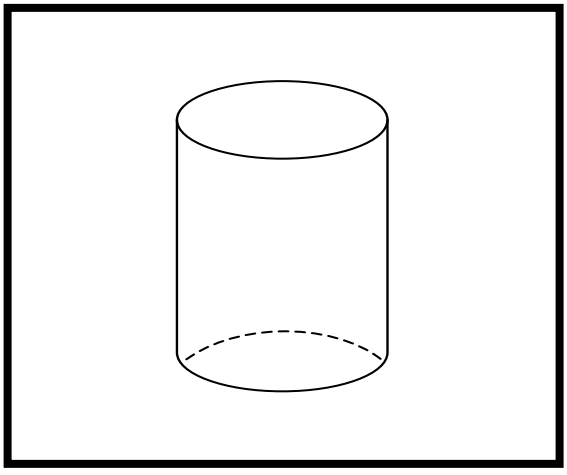






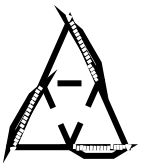




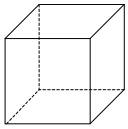


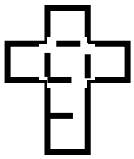
## More Fun With Nets!

Can you match the **net** with its' **name** and **3-dimensional figure**? Draw a line to connect **all three** together. Use the foldable geometric solids and paper nets to help you.

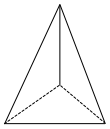


**Rectangular Prism**

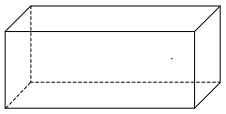


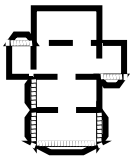


**Cylinder**

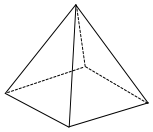


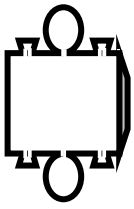
**Triangular Pyramid**



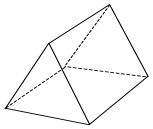


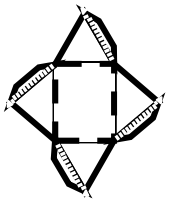
**Rectangular Pyramid**



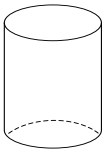


**Cube**



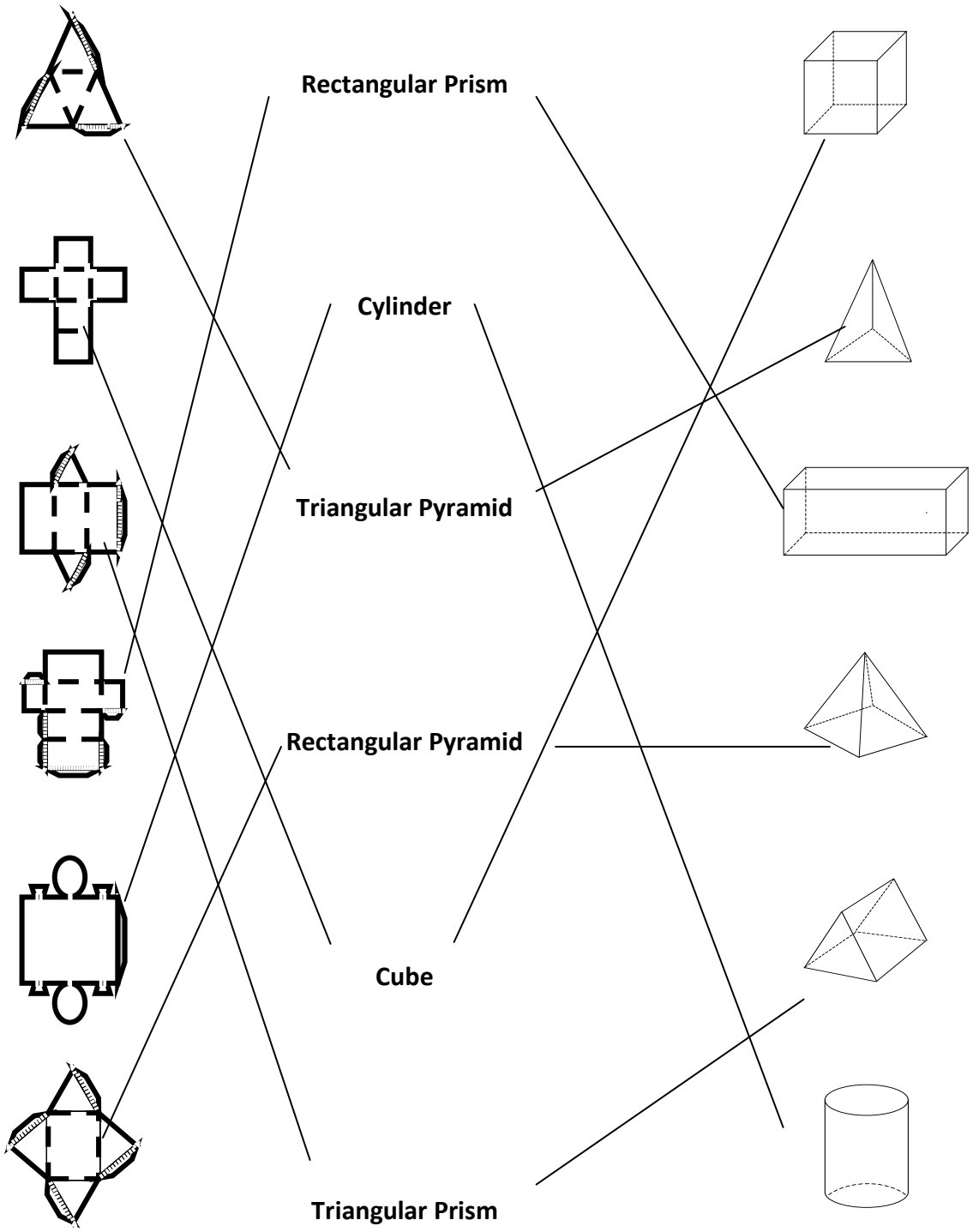


**Triangular Prism**



# More Fun With Nets! Answer Key

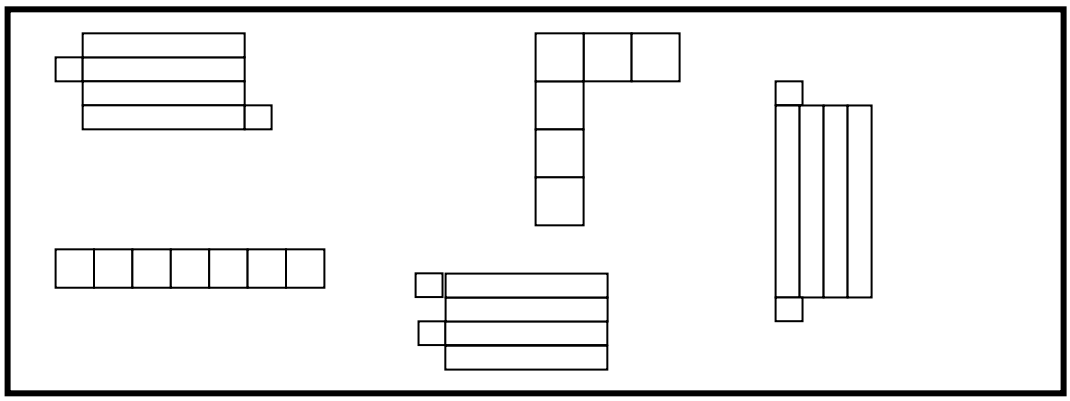
**Can you match the net with its' name and 3-dimensional figure? Draw a line to connect all three together. Use the foldable geometric solids and paper nets to help you.**



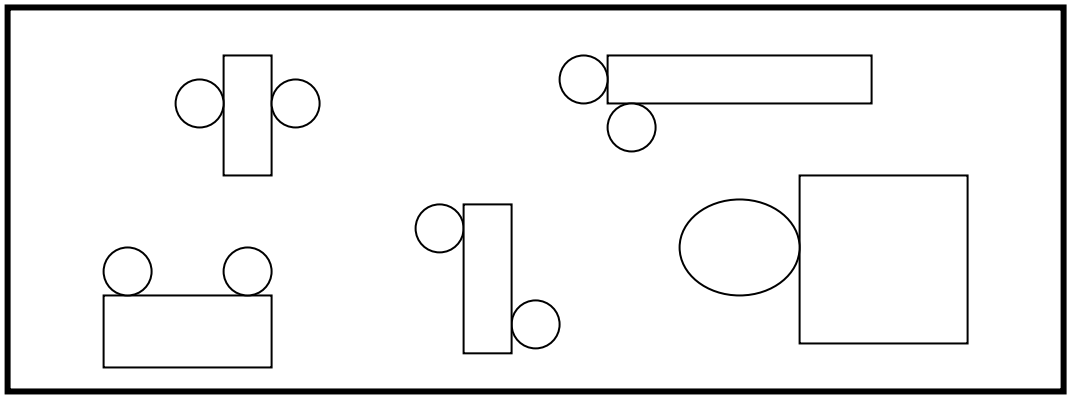
# Comet's New Dog House

Name: _____

Captain Invincible wants to build Comet a new dog house once they return from space. He wants to make the house a rectangular prism. Which of the following nets could Captain Invincible use to create Comet's new house? Circle your answers.



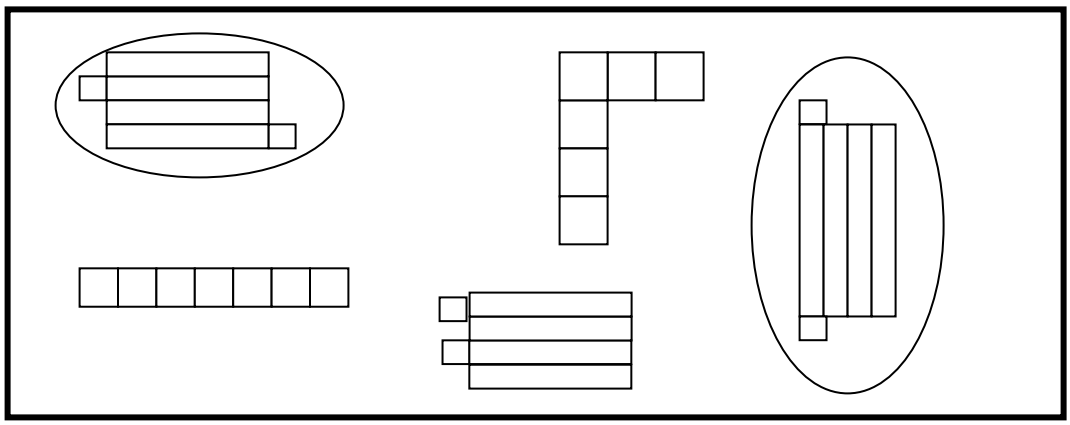
Captain Invincible also wants to make Comet a special dog bowl. He needs this to be a cylinder. Which of the following nets could Captain Invincible use to create Comet's new dog bowl? Circle your answers.



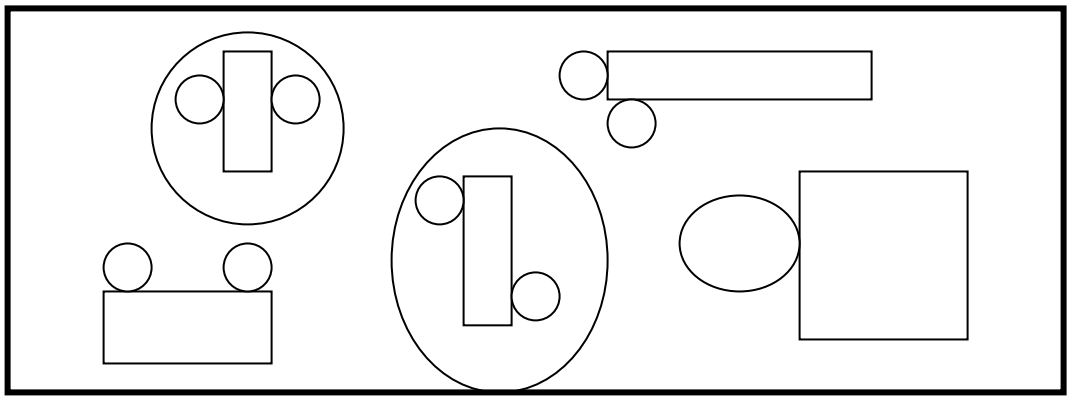
# Comet's New Dog House Answer Key

Name: _____

Captain Invincible wants to build Comet a new dog house once they return from space. He wants to make the house a rectangular prism. Which of the following figures could Captain Invincible use to create Comet's new house? Circle your answers.



Captain Invincible also wants to make Comet a special dog bowl. He needs this to be a cylinder. Which of the following figures could Captain Invincible use to create Comet's new dog bowl? Circle your answers.



Name: _____

## Summative Assessment

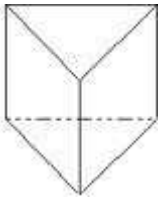
Before Captain Invincible and Comet return to Earth, they must make it through some obstacles first. Help Captain Invincible and Comet overcome the obstacles by using your knowledge of 3-dimensional figures.

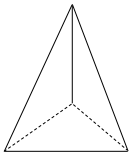
1. A flying shape is headed straight towards the spaceship. Captain Invincible realizes it is a ***triangular prism*** and must destroy it before it hits. How did Captain Invincible know it was a ***triangular prism***? What 2-dimensional shapes did he recognize?

Ⓐ 4 triangles
Ⓑ 2 triangles and 4 rectangles
Ⓒ 6 rectangles
Ⓓ 2 triangles and 3 rectangles

2. Another button broke on the control panel of the spaceship. Captain Invincible needs to replace it with a ***triangular pyramid***. Which of the following buttons would he **NOT** be able to use to fix the problem?

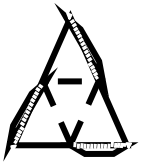
Ⓐ

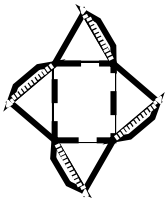

Ⓑ

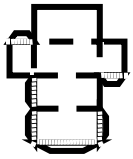

Ⓒ

Ⓓ

3. Oh, no! Comet got so nervous that he ate the blueprint for his new dog house. Captain Invincible can not remember how to build the ***rectangular prism*** dog house again. Which one of these blueprints (nets) could he use?


Ⓐ


Ⓑ


Ⓒ

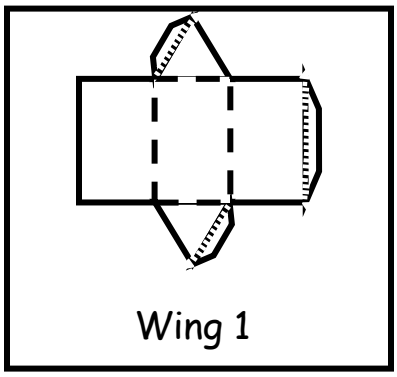
Ⓓ

## Brief Constructed Response

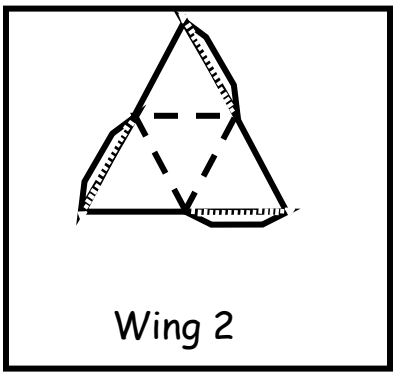
Captain Invincible and Comet have almost made it back to Earth but one of the **triangular pyramid** wings on their ship was destroyed during a meteor shower!

**Part A**

Which of the following figures could they use to replace the wing? Write your answer on the line provided below.



Wing 1



Wing 2

_____

**Part B**

Use what you know about 3-dimensional figures and their nets to explain your answer. Use words, numbers, and/or symbols in your explanation.

_____

_____

_____

_____

_____

# Summative Assessment – Answer Key

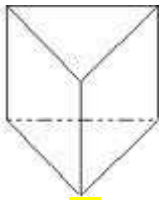
Before Captain Invincible and Comet return to Earth, they must make it through some obstacles first. Help Captain Invincible and Comet overcome the obstacles by using your knowledge of 3-dimensional figures.

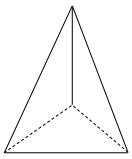
1. A flying shape is headed straight towards the spaceship. Captain Invincible realizes it is a ***triangular prism*** and must destroy it before it hits. How did Captain Invincible know it was a ***triangular prism***? What 2-dimensional shapes did he recognize?

Ⓐ 4 triangles
Ⓑ 2 triangles and 4 rectangles
Ⓒ 6 rectangles
Ⓓ 2 triangles and 3 rectangles

2. Another button broke on the control panel of the spaceship. Captain Invincible needs to replace it with a ***triangular pyramid***. Which of the following buttons would he **NOT** be able to use to fix the problem?

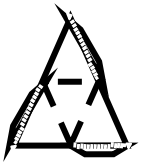
Ⓐ

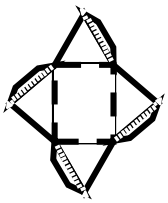

Ⓑ

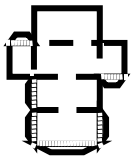

Ⓒ

Ⓓ

3. Oh, no! Comet got so nervous that he ate the blueprint for his new dog house. Captain Invincible can not remember how to build the ***rectangular prism*** dog house again. Which one of these blueprints (nets) could he use?


Ⓐ


Ⓑ


Ⓒ

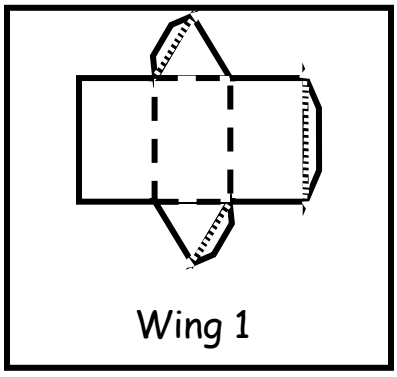
Ⓓ

## Brief Constructed Response

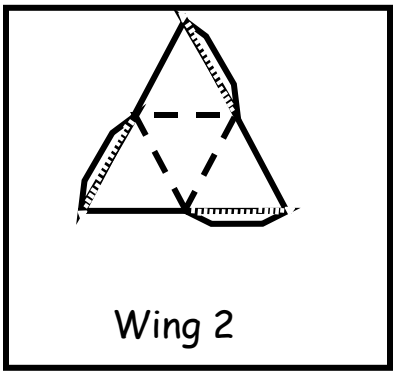
Captain Invincible and Comet have almost made it back to Earth but one of the **triangular pyramid** wings on their ship was destroyed during a meteor shower!

**Part A**

Which of the following figures could they use to replace the wing? Write your answer on the line provided below.



Wing 1



Wing 2

**Answer: Wing 2**

**Part B**

Possible responses may include:

- I know that wing 2 is a triangular pyramid because it is made of 4 triangular faces. The base shape is a triangle and the three side faces will fold to create a pyramid. Wing 1 is a prism and, not a pyramid. It is made of triangles and rectangles. Captain Invincible should use wing 2, the triangular pyramid, to replace the broken wing.

- Both wings show triangular bases, however, wing 1 has rectangles for faces and wing 2 has only triangles. Therefore, wing 1 is a triangular prism and wing 2 is a triangular pyramid. Captain Invincible needs a triangular pyramid so he should use wing 2.